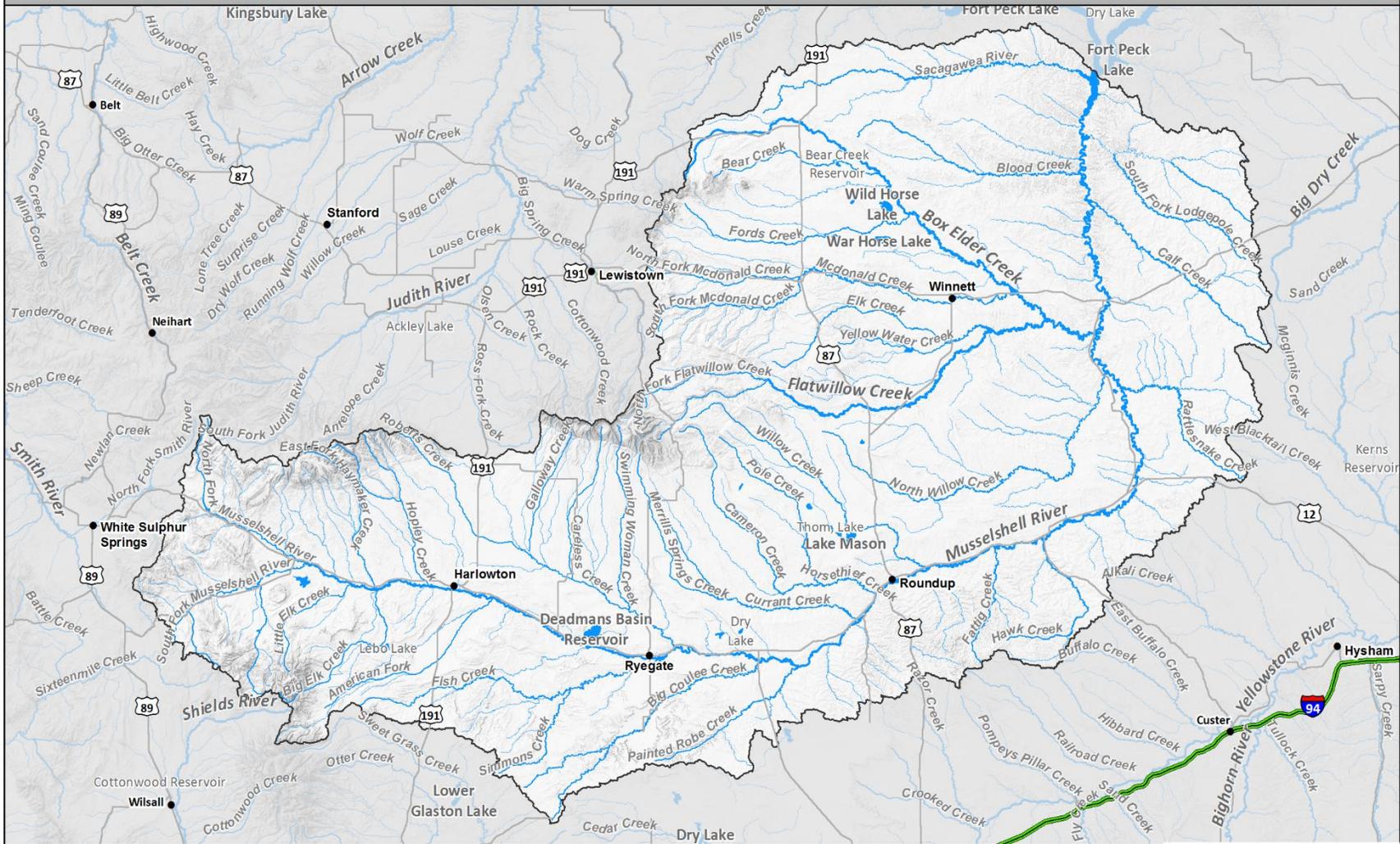


Musselshell River Drainage

MONTANA FWP



 Drainage Boundary



Map Produced by:
ASP - Geographic Data Services
ISR 43965 - Nov 23, 2018



Administrative boundaries and FWP Lands data from Montana Fish, Wildlife & Parks, Helena, MT. Background Imagery from ESRI

Musselshell River Drainage

Physical Description

The Musselshell River headwaters start at approximately 9,200 feet elevation and converge with the Missouri River and Fort Peck Reservoir at 2,200 feet. The Musselshell flows from the confluence of the North and South forks (near the Wheatland and Meagher County border) for nearly 340 miles. The North Fork flows nearly 32 miles, and the South Fork flows nearly 31 miles. The drainage area covers approximately 8,000 square miles and includes 7,601 surface acres of lakes or reservoirs in 36 individual waterbodies. The Musselshell River basin is a low-density drainage system and predominantly snowmelt-fed. Flows are highest in the late spring and early summer and decrease to almost a trickle unless supplemented by the reservoirs. Ice jams are common in the winter and can cause localized flooding. Based on habitat characteristics and fisheries present, the Musselshell is divided into three zones. The upper Musselshell refers to the drainage above the town of Ryegate, the middle Musselshell includes the drainage between the towns of Ryegate and Roundup, and the lower Musselshell is the drainage downstream of Roundup.

Physical function of the Musselshell River has been substantially impacted by recent floods. In 2011, a rain-on-snow event created a 150-year flood event that lasted almost 30 days. As a result, the river decreased in length by over 37 river miles (~10% of the channel length) with 59 documented meander cutoffs (avulsions). Subsequent flooding in 2014 and 2018 compounded the 2011 damages. Post-flooding, the river has become increasingly steepened and incised which increases water velocities and bank erosion. Floodwaters have also breached or flanked numerous diversion structures throughout the entire basin. Repairs to many of the affected diversion dams were not feasible (e.g., river moved too far from headgate) and cost prohibitive. As such, water users have been switching from gravity-fed ditches to pump systems.

Upper Musselshell – Headwaters to Ryegate

The upper Musselshell River is primarily a coldwater fishery, and several tributaries contribute flow to the mainstem upper Musselshell River, including the North and South forks. Major tributaries on the North Fork are Checkerboard and Spring creeks. Major tributaries on the South Fork include Alabaugh and Cottonwood creeks. Cottonwood Creek is a popular trout fishery on U.S. Forest Service (USFS) lands with a relatively accessible mountain lake (Forest Lake). Tributaries downstream from the forks include Daisy Dean, Little Elk, Haymaker, Big Elk, Hopley, Antelope, Lebo, American Fork creeks, and several smaller streams. Upper Musselshell River substrates are dominated by gravels and cobble.

The upper zone contains several irrigation storage reservoirs, which alter the natural flow regime of the river (e.g., timing, magnitude, and duration of stream flows). Major reservoirs include Bair Reservoir on the North Fork, Martinsdale, an off-channel reservoir on the South Fork, and Deadmans Basin, an off-channel reservoir on the mainstem. Combined, these three reservoirs store a volume of approximately 106,616 acre-feet of water at full pool. There are dozens of irrigation diversions throughout the upper Musselshell, with numerous large diversions located on the North Fork, South Fork, and mainstem capable of diverting more than 1,400 cfs. Additionally, many tributaries also contain stock dams, low-head diversions, and other obstacles such as culvert barriers that further fragment the aquatic habitat.

The physical alterations to the river from water storage practices and irrigation infrastructure have been both beneficial and detrimental to fish populations. Some structures prevent upstream passage for fish while others, although passable, remove large quantities of water, severely limiting instream flows downstream of the diversions. Conversely, the storage reservoirs often return water to the river for irrigation demands in the summer, which can help maintain some fisheries in periods of drought.

Water quality is also a concern in the upper Musselshell. Land use is dominated by grazing mixed with hay and crop land, and some riparian areas are severely degraded with loss of willow and cottonwood. Agricultural runoff and irrigation returns can increase salinity, nutrient levels, and sediment loads, which increases water temperature and turbidity, and decreases dissolved oxygen. Water chemistry data indicates these influences occur throughout the Musselshell watershed, beginning in the upper river and creating cumulative water quality effects downstream.

Middle Musselshell – Ryegate to Roundup

Several tributaries contribute flow to the middle Musselshell River, including Fish, Careless, Big Coulee, Painted Robe, Dean, Currant, Goulding, Pole, and Halfbreed creeks. The tributaries in this reach are prone to dewatering and are normally dry or intermittent during irrigation season. Gravels, sand, silt, and isolated sandstone rock slabs along sandstone cliffs are the primary substrates in this zone.

There are no identified storage reservoirs in this section of the Musselshell, although water releases from Deadmans Basin using a canal ultimately returns water into Careless Creek. There are approximately 10 low-head irrigation diversions in the middle Musselshell River (there are four major diversions capable of diverting a total of 200 cfs), and several additional rock weirs are in place to raise the river stage for irrigation pumps. The 2011 flood and subsequent high-water events in 2014 and 2018 breached and or flanked a few of the larger diversions. As of 2022, dam removal efforts included the removal of the Egge Diversion Dam. Two other defunct diversion dams are still in the river, but plans are in place to remove them by 2025. The physical alterations in this zone may seasonally preclude fish passage. In addition, the diversions lack adequate fish screens, which divert fish from the irrigation canal back into the river. As a result, many fish are either carried onto fields or trapped in canals and siphons as they are dewatered each fall. Water quality issues exist in this zone due to irrigation returns that increase salinity (e.g., sodium sulfate) and cause nutrient enrichment. Changes in operational releases of water from Deadmans Reservoir through Careless Creek have reduced, but not eliminated, these effects. The dewatering for irrigation purposes in this zone reduces the fishery potential by limiting available habitat.

Lower Musselshell – Roundup to Mouth

Several tributaries contribute flow to the lower Musselshell River, including Willow, Flatwillow, Box Elder, Fattig, Hawk, Rattlesnake, Calf, and Lodgepole creeks, in addition to several small intermittent drainages. Flatwillow Creek is the largest tributary in the lower Musselshell. Substrates in the lower Musselshell River are dominated by silt and sand but include some interspersed gravels and bedrock.

The lower Musselshell River can become fragmented due to physical alterations like diversion dams and check dams during lower flow periods (i.e., outside of the high spring flow period). There are five major irrigation diversions capable of diverting a total of 418 cfs. Petrolia Reservoir, an on-stream irrigation reservoir on Flatwillow Creek with approximately 9,000 acre-feet of storage, severely limits flow

immediately downstream during low-water periods. There are seven recorded dams between Roundup and the Davis/Korenko Dam, which is three miles downstream of the town of Musselshell. The Delphia Melstone Dam is one of those seven and is located at the town of Musselshell. The Delphia Melstone Dam and the Davis/Korenko Dam downstream inhibit fish passage on a regular basis, and other upstream dams can reduce passage of fish into the middle Musselshell. For example, fish surveys documented channel catfish and smallmouth bass moving upstream of the Delphia Melstone Dam, but these movements likely only occurred during high water events. Subsequent fish surveys have not found substantial populations of game fish species above the Delphia Melstone Dam. In 2018, long duration, high spring flows flanked, and sediment buried the uppermost diversion in the lower Musselshell River section. Future efforts may be made to remove this dam. There are no other documented dams or diversions from Musselshell Dam to the confluence with the Missouri River.

Fisheries Management

FWP maintains recreational reservoir fisheries through stocking efforts in Martinsdale, Bair, Deadmans Basin, Lebo, Petrolia, and Yellow Water reservoirs, in addition to numerous small impoundments. Stocked species include rainbow trout, westslope cutthroat trout, tiger muskie, largemouth bass, walleye, brook trout, brown trout, and kokanee salmon. The mainstem Musselshell and tributaries are managed as wild fisheries, relying on natural reproduction to sustain the fish populations.

Upper Musselshell Fisheries Management

The upper Musselshell and associated tributaries support many species of fish such as brook trout, brown trout, rainbow trout, Yellowstone cutthroat trout, westslope cutthroat trout, mountain whitefish, longnose dace, Rocky Mountain sculpin, longnose sucker, shorthead redhorse, white sucker, mountain sucker, occasional fathead minnow, flathead chub, common carp, stonecat, lake chub, northern redbelly dace, and northern redbelly x finescale dace hybrids. The mainstem supports a population of brown trout (comprising about 96% of the total trout) and mountain whitefish, while the tributaries support brook trout (about 56% of the total trout), and lesser numbers of rainbow trout and brown trout, mountain whitefish, and cutthroat trout. Brown trout are also the most common species in much of the North and South forks. Early efforts in 1961 included stocking Arctic grayling (native to Montana, but not the Musselshell watershed) in the upper reaches of the South Fork of the Musselshell in two separate ponds; however, records indicate neither introduction established a viable population.

Fisheries management activities in the drainage from the forks upstream intend to monitor and maintain current recreationally valuable populations. Based on a comprehensive status review, historic sampling, and literature reviews, cutthroat trout are likely not native to the upper Musselshell ([Shepard et al., 2002](#)). Limited native species conservation efforts are planned beyond maintenance of mountain whitefish populations and various minnow and sucker populations. Hybridized cutthroat trout occur in Forest Lake and the upper Cottonwood Creek drainage, but those fish do not currently have conservation value. Routine monitoring of the fisheries in the forks will track any influences from increasing pressure and habitat improvements occurring in the area. Fisheries management activities will pursue projects aimed at improving habitat conditions that prove beneficial to fisheries populations.

Brown trout population estimates at the Selkirk FAS occurs on an irregular basis since 1984. Currently, the goal is to conduct population estimates at this site once every three years. However, many of the estimates attempted between 2001–2008 were not completed, as recapture rates were too low.

Surveys suggested the population consisted of a few large adult brown trout and more abundant, but still relatively few, juveniles. Low population abundance and small size structure is likely due to poor instream flow conditions during an extended drought. Brown trout electrofishing monitoring in 1992 estimated of 890 brown trout per mile, which was attributed to a good spawn in 1991. Estimates were conducted in 2010, 2012, 2014, and 2017, and 2021 with a range from 156 brown trout per mile in 2021 to 910 in 2012. Overall, average density for years with estimates from 1984 through 2017 was approximately 352 brown trout per mile.

Stream angling pressure in this zone is low. [FWP Angling Pressure Surveys](#) indicated the Musselshell River section upstream of Lavina received 319 angler days. Anecdotally, the forks are gaining popularity and angling pressure is increasing; however, access remains limited. The major reservoirs receive moderate angling effort. The 2019 [FWP Angling Pressure Surveys](#) estimated pressure to be 2,140 angler days at Bair Reservoir, 5,799 angler days at Martinsdale Reservoir, and 1,422 angler days at Deadmans Basin Reservoir. FWP staff conducted a weekend creel survey of Bair and Martinsdale reservoirs during the summer of 2022. Preliminary results suggest that angling pressure is light and angler satisfaction is generally high at both reservoirs.

Management of Bair Reservoir will seek to provide a quality recreational opportunity via put-grow-and-take trout fisheries and relying on natural recruitment from the North Fork Musselshell River. Trout abundances in Bair are routinely high and fish condition is generally low. Stocking rates at Bair have been decreased in recent years and will continue to be evaluated based on the biology of the fishery. Natural recruitment from the North Fork Musselshell is likely contributing to the high abundances and needs to be evaluated. Bair Reservoir is generally appreciated by anglers for its ease of catching trout. The biomass of the reservoir is dominated by sucker species and effort may be considered to suppress their numbers. FWP staff seeks to maintain high catch rates of rainbow trout in Bair by establishing a minimum catch per unit effort (CPUE) goal of 10 fish per net. Additionally, FWP staff hope to improve the average condition of fish by establishing a minimum average relative weight (W_r) goal of 85. FWP will monitor this goal via annual fall gillnet surveys. Efforts to improve the condition of rainbow trout by modifying stocking rates and/or relying on natural recruitment will be balanced with the goal of maintaining high catch rates in the reservoir. Goal ranges may be adjusted based on the biology of the fishery. It should also be emphasized that Bair Reservoir is an irrigation storage impoundment and water levels are managed as such, with little priority or consideration given to the aquatic habitat impacts of drastic water level fluctuations. These habitat impacts are outside of FWP's management control but can have substantial impacts on the productivity and quality of the fisheries.

Management of Martinsdale Reservoir will seek to provide a quality recreational opportunity via put-grow-and-take trout fisheries. Rainbow trout catch rates in Martinsdale have been low in recent years and there is some concern the Gerrard strain portion of the stocked rainbow trout have not performed well. The FWP stocking program will be adjusted to decrease the proportion of Gerrard strain in favor of Arlee and Eagle Lake strain fish. Trout condition in Martinsdale is very high and the recently added brown trout component is performing very well, with numerous trophy fish produced. This combination of rainbow and brown trout stocking will continue based on the biology of the fishery. The biomass in Martinsdale is dominated by suckers and efforts may be considered to suppress their numbers. Additional species that may be considered for stocking after appropriate environmental review include kokanee, tiger trout, and burbot. Management goals for Martinsdale will seek to improve rainbow trout catch rates by establishing a minimum CPUE of 5 fish per net. Additionally, management efforts will seek

to maintain the trophy brown trout opportunity by establishing a proportional stock density (PSD) goal of at least 30. FWP will monitor these metrics via annual fall gillnet surveys. Goals may be adjusted in based on the biology of the fishery. It should also be emphasized that Martinsdale Reservoir is an irrigation storage impoundment and water levels are managed as such, with little priority or consideration given to the aquatic habitat impacts of drastic water level fluctuations. These habitat impacts are outside of FWP's management control but can have substantial impacts on the productivity and quality of the fisheries.

Deadmans Basin is managed as a coldwater rainbow trout and kokanee salmon fishery with a smaller brown trout and a tiger muskie component. Tiger muskie were first stocked into Deadmans in 1998. The objectives were to provide a trophy fishery for tiger muskie, reduce white sucker abundance and biomass, and improve rainbow trout average size and body condition. Management goals include improving angler catch rates for rainbow trout. A stock assessment is currently in progress to see if changes to the number and strain of stocked rainbow trout are warranted. Age and damages from the 2011 flood led to restoration efforts in 2015 targeting the repair and reconstruction of the Deadmans Diversion and canal headgates. The new diversion has a rock ramp structure to improve fish passage for native minnows and other fish including northern redbelly dace, white sucker, and brown trout. Although the ramp was designed to allow an array of fish species to pass when water is moving through the ramp, it is likely several species of prairie fish, like minnows and dace, cannot use the ramp effectively. FWP staff plans to implement a fish passage study at the rock ramp.

Management activities of various smaller waterbodies in the upper Musselshell are summarized in the table below.

Middle Musselshell Fisheries Management

The middle Musselshell supports at least 17 species of fish, but the abundance of sport fish is generally low. Documented species include stonecat, carp, fathead minnow, flathead chub, lake chub, longnose dace, western silvery minnow, and brassy minnow, longnose sucker, mountain sucker, river carpsucker, shorthead redhorse, smallmouth bass, brown trout, and mountain whitefish. Additionally, Deadmans Basin Reservoir which is geographically in this zone but reported in the upper Musselshell, contains stocked populations of rainbow trout, kokanee salmon, and tiger muskie. Atlantic salmon and coho salmon have also been stocked into Deadmans Basin; however, those species are no longer in the reservoir or river. Some channel catfish and sauger are likely present in this zone at times of high water near Roundup, but they have not been reported in any survey since 1979. Discussions with longtime anglers suggest sauger and channel catfish were more common in the 1950s and 1960s as far upstream as Lavina. Brown trout are found in the upstream portions of the middle Musselshell along with an occasional rainbow trout; however, in numbers much lower than those in the upper Musselshell.

Warmwater game fish densities in this zone may be influenced by irrigation diversions inhibiting movements. The warmer river sections would likely provide good habitat for channel catfish if they could migrate upstream past existing barriers. Sauger would likely be found in this zone each spring, migrating back to the lower Musselshell and Missouri River by midsummer if existing dams were passable. Food is not likely a limiting factor as forage fish are abundant and can support the current populations of predatory fish.

From 1977 to 1981, FWP staff stocked smallmouth bass within the middle Musselshell River from Lavina to Roundup. The bass population did not expand very quickly, and many of these stocked fish were later found downstream in the lower Musselshell, ultimately pioneering the smallmouth bass fishery in Fort Peck Reservoir. Nonetheless, there was limited recruitment and the bass in the middle Musselshell display some of the highest growth rates for this species in Montana. Smallmouth bass maintain healthy populations beginning near Roundup but appear to migrate as far up as Lavina. The Lavina Diversion Dam appears to be an effective barrier for preventing upstream movement. Survey work near Lavina and Roundup show the smallmouth bass fishery continues to provide opportunity and has persisted since the initial stockings.

Deadmans Basin Reservoir is included in the middle Musselshell because return water enters in the zone through the Barber Canal and Careless Creek. Any fish that move out of the reservoir could reach the river; however, there are no sustained populations of rainbow trout, kokanee salmon, and tiger muskie found in the river. The reservoir provides habitat for white sucker, shorthead redhorse, longnose sucker, carp, as well as a limited number of minnow species that enter the reservoir through the Deadmans canal. The Deadmans fishery relies heavily on stocking rainbow trout, kokanee salmon, and tiger muskie. Without stocking, this reservoir would provide a limited fishery for brown trout that come from the upper Musselshell via the Deadmans canal system.

FWP programs, the Musselshell Water Coalition, various landowners, and other government programs have implemented several stream habitat improvements in the middle Musselshell River, largely because of flood damages in 2011, 2014, and 2018. The coordinated efforts included improving the fish passage at the Deadmans Diversion rock ramp and the removal of Egge Diversion Dam. Floodwaters have flanked the Naderman Diversion, and water users subsequently abandoned the diversion. Other stream habitat improvements included Federal Emergency Management Agency (FEMA) and Natural Resource Conservation Service (NRCS) funding to irrigators for converting their diversions to pump irrigation. The Parrot Diversion remains a passage barrier, but it provides a second barrier that prevents upstream movement of northern pike. While there has been significant work to improve stream habitat in the middle Musselshell, there remains some barriers to fish passage. The Stella Diversion is the first barrier in the middle Musselshell for fish to move upstream and is still functioning. In addition, there are several other downstream diversions in the lower Musselshell.

In 2015, FWP attempted to recolonize channel catfish to the middle and upstream portions of the lower Musselshell. About 30 adult channel catfish were captured in the lower Musselshell and relocated into the upper Musselshell. In 2016, FWP staff conducted a second wild transfer by stocking channel catfish several miles downstream of Ryegate. Possible activities that can improve channel catfish populations in the middle Musselshell River include increasing channel length by reducing habitat fragmentation and continue working with partners on maintaining instream flows in the Musselshell. In addition, FWP may conduct future fish transfers to add genetic diversity to current channel catfish populations.

Lower Musselshell Fisheries Management

Despite severe dewatering, high temperatures, and poor water quality, the lower Musselshell contains a nearly intact native fish ecosystem. The lower Musselshell has been documented to support at least 30 species of fish. These species include catfish (black bullhead, channel catfish, and stonecat), minnows (brassy minnow, common carp, emerald shiner, fathead minnow, flathead chub, longnose dace, plains minnow, sand shiner, spottail shiner, and western silvery minnow), suckers (longnose sucker, mountain

sucker, river carpsucker, shorthead redhorse, smallmouth buffalo, bigmouth buffalo, and white sucker), walleye, sauger, black crappie, bluegill, green sunfish, smallmouth bass, burbot, freshwater drum, goldeye, and northern pike. Many of these species are not found at Roundup, but most are found below the Delphia-Melstone Diversion Dam at the town of Musselshell. Unverified reports of paddlefish being found in a field near Melstone were made as the flood waters of 2011 receded.

Fisheries management activities in the lower Musselshell focus on periodic monitoring with an emphasis on maintaining existing populations within historic levels and enhancing important recreational or sensitive populations. In the mainstem Musselshell, monitoring activities are challenging due to dewatering, gear limitations, and the area's remoteness. There is a need to increase sampling effort to evaluate trends in smallmouth bass and walleye abundance and associated impacts to native species assemblages. The relative wet period of the 2010s resulted in smallmouth bass distribution extending 40 miles up the Box Elder Creek drainage and there is concern regarding impacts to native minnow assemblages. Maintaining and improving native fish assemblages in Flatwillow Creek below Petrolia Reservoir, McDonald Creek, and Box Elder Creek drainages are management goals. The headwaters of Box Elder, Fords, and Flatwillow creeks contain salmonids and management activities consist of monitoring population statuses with the goal of maintaining recreational opportunities. Conservation populations of westslope cutthroat trout occur in Half Moon and Collar Gulch creeks. These populations are routinely evaluated to track abundance trends and genetic status. If warranted, efforts to minimize risks associated with non-native salmonid competition and hybridization may occur.

Angling pressure in the lower Musselshell River is generally low and primarily targets channel catfish, smallmouth bass, and walleye. Petrolia Reservoir receives a large amount of pressure for its size and has received increased pressure in recent years due to a quality walleye fishery and the Crooked Creek access to Fort Peck being unavailable due to reservoir elevations. Yellow Water Reservoir was a popular recreational fishery that received substantial pressure historically, but the unproductive nature of the current fishery has resulted in a decrease in pressure and opportunity. The various small ponds and reservoirs provide numerous diverse angling opportunities and receive seasonal angling pressure as water conditions allow. The headwater trout streams receive light angling pressure during the summer months. Passive creel survey boxes have been used to assess use on the smaller ponds and reservoirs which have proven useful and demonstrated surprising results in the number of anglers and angler demographics. A creel survey of Petrolia Reservoir would be beneficial to evaluate angler use, satisfaction, and corroborate harvest trends observed from ongoing tagging studies.

FWP regularly stocks fish to provide recreational angling opportunities in pond and reservoirs throughout the lower Musselshell. Yellow Water Reservoir was a popular stocked fishery known for producing large rainbow trout. Rainbow trout are stocked in the reservoir; however, the productivity of the fishery has changed substantially. Common carp and white suckers were flushed into the reservoir in the early 2010s and unauthorized introductions of walleye and yellow perch occurred in the mid-10s. These changes in the fishery have drastically reduced the quality of the trout fishery. The stocking plan at Yellow Water may be changed to better utilize current reservoir conditions to provide a quality recreational angling opportunity and species alternatives may be considered. The various small pond and reservoir fisheries in the lower Musselshell often rely on stocking and wild fish transfers. Many of these waterbodies are susceptible to winterkill during low water years. Stocking efforts attempt to maximize recreational opportunities by using wild fish transfer to jumpstart depleted populations, or by stocking trout initially which provide opportunity within a year in most waters, followed by largemouth

bass, crappie, or similar species which take longer to provide angling opportunity due to slower growth rates. Once bass or crappie populations are established, they are often able to naturally reproduce and become self-sustaining populations if water conditions allow. All pond and reservoir stocking are based on the biology of the fishery and habitat conditions. Winter aeration of some recreationally important ponds/reservoirs may be used to mitigate the risk of winterkill, as conditions allow.

Petrolia Reservoir is annually stocked with walleye fry or fingerlings. Petrolia stocking rates have been steady in recent years, but drought conditions and forage population levels may require adjustments. In the past, depleted yellow perch populations in Petrolia were supplemented with wild fish transfers or hatchery stocking. Wild fish transfers and adjustments to the stocking plan will be based on the biology of the fishery. Annual spring tagging of walleye will continue as it allows for the evaluation of harvest trends. Petrolia is managed primarily as a harvest-oriented walleye fishery. Catch rates of walleye in Petrolia sampling have large interannual variation, primarily due to the sporadic nature of the water conditions which impact reservoir habitat, forage populations, natural recruitment, and harvest rates. In recent years, high abundances of walleye and poor recruitment stemming from low reservoir elevations have resulted in low yellow perch abundances and a perch population dominated by larger individuals. Forage conditions in addition to the high abundance of walleye in Petrolia likely negatively impact walleye growth rates and compress the size structure of the population downward. With that in mind, FWP staff will establish a primary management goal of five fish per net to maintain harvest opportunities in Petrolia. FWP will establish a secondary goal of maintaining walleye PSD in the 20 to 50 range to provide adequate numbers of quality-sized fish for harvest. The primary management tool to meet the established goals will be adjustments to stocking. These metrics will be monitored via annual fall gillnet surveys. Fisheries management goals may be adjusted based on the biology of the fishery. It should also be emphasized Petrolia Reservoir is an irrigation storage impoundment and water levels are managed as such, with little priority or consideration given to the aquatic habitat impacts of drastic water level fluctuations. These habitat impacts are outside of FWP's management control but can have substantial impacts on the productivity and quality of the fisheries.

Habitat

The Musselshell drainage contains a wide range of habitat types from cold, mountain headwater streams to turbid prairie rivers. Improved water management on the mainstem Musselshell has benefited the fishery and habitat. Despite these improvements, dewatering remains an issue for tributaries and the mainstem Musselshell River. Proposed instream flow reservations in Alabaugh, American Fork, Big Elk, Checkerboard, Cottonwood, and Spring creeks and the mainstem, North Fork and South Fork Musselshell rivers are commonly not obtained during the irrigation season. As a result, many reaches are dewatered. Dewatering limits fishery productivity, exacerbates water quality impairments, limits habitat, and creates thermal stressors. Continuing to pursue water conservation projects will provide benefit to the fishery by increasing the quantity and quality of physical habitat, improving water quality, and stabilizing the thermal regime of the Musselshell River.

Maintaining the natural flow regime is critical for restoring the natural function of streams in the drainage. Flooding is a natural part of the flow regime that maintains habitat diversity and provides important migratory and spawning cues. In the last 15 years, highwater events caused substantial changes to the river planform, introducing large amounts of sediment and debris that contributed to the formation of new channel and floodplain habitat. The Musselshell's channel continues to adjust its

geometry and gradient as the large influx of sediment from these highwater events moves through the channel network. Although these highwater events can be destructive to communities, irrigation infrastructure, and roads, they are a natural part of the river's flood patterns. There are many examples in other river basins across the western United States that have shown floods can be promoted for their habitat benefits while minimizing damage. Habitat rehabilitation projects that accommodate flooding but protect homes, roads, and canals should be encouraged. Coordinated efforts among the Water Court, Musselshell Distribution Project, and the Musselshell Watershed Coalition, among others, have made significant progress on the dewatering issue, resulting in improved flows in the main channel. Continued collaboration with the Musselshell Watershed Coalition and other stakeholders is critical to addressing habitat needs in the drainage.

Common habitat issues throughout the Musselshell River basin include dewatering, habitat fragmentation, floodplain disconnection, nonpoint source pollution, and riparian degradation. The severity of impairment varies throughout the Musselshell. FWP and interested stakeholders will continue to pursue potential projects aimed at addressing these common habitat issues. Additionally, there are numerous channel-spanning diversion structures throughout the Musselshell River. These structures act as partial or complete barriers to fish movement during the low-flow season. Some may act as barriers year-round. FWP and interested stakeholders will also pursue projects that work to improve fish passage at diversion sites and minimize fish lost to ditches and canals.

Bank stabilization is an important component of river rehabilitation and flood recovery. Major flood events accelerated bank erosion and has led to riprap projects throughout the basin. FWP and other partners have been working towards applying soft-bank stabilization techniques and bank shaping that support riparian recovery. In 2021, FWP and others implemented a soft-bank stabilization project near Two Dot which rebuilt approximately 100 linear feet of bank using native materials. These native materials included 2,000 willows inserted between two stacked fabric soil lifts and affixed with a conifer fascine toe.

The South Fork Musselshell valley bottom is bisected for much of its length by an abandoned railroad grade, which has resulted in reduced floodplain function and capacity. As a result, FWP and interested stakeholders will pursue projects that address the railroad grade and improve floodplain connection. The North Fork Musselshell downstream of Bair Reservoir experiences chronic turbidity, the direct cause of which is currently uncertain. Water quality work should include projects that seek to determine the cause and address the turbidity issue. Many of the smaller tributaries in the upper Musselshell experience poor riparian condition and water quality impairments primarily due to livestock grazing, historic mining practices, and road/trail associated impacts. Habitat work should be pursued to improve riparian grazing management, treat historic mining impacts, and address sedimentation and confinement associated with existing road/trail infrastructure. A total maximum daily load (TMDL) study is ongoing for the entire Musselshell drainage and the Montana Department of Environmental Quality (DEQ) has identified numerous streams in the upper Musselshell as impaired. The DEQ has completed TMDL assessments for E. coli impairments and plans to assess TMDLs for metals, nutrients, and sediment.

In the middle Musselshell, most habitat work involves bank stabilization and meander reactivation projects. For example, FWP and others stabilized the Kilby Butte bank in early 2022. Located seven miles downstream of Roundup, the Kilby Butte site is immediately upstream of a diversion. High flows flanked

the diversion and created a high, steep bank. Using a nondeformable rock toes and two stacked soil lifts, FWP and others stabilized almost 600 linear feet of riverbank.

Many channel-spanning diversions are present in the lower Musselshell River and act as partial or complete barriers during low-flow conditions. For example, previous studies suggest the Davis/Korenko Dam and Delphia-Melstone Dam in the lower Musselshell act as complete barriers for many fish species during normal flow conditions. These studies have not documented sauger and walleye migrating upstream of these diversion dams; however, in 2020 and 2021, FWP sampling efforts collected seven sauger near Mosby. Other species may be present in the system but in low numbers. For instance, FWP caught one burbot and one freshwater drum below the Davis Dam in 1981, and an angler reported a second burbot as far up as Shawmut. These fish likely migrated from the Missouri River during high spring flows. High quality fishing can occur in the lower Musselshell, but it is impaired due to unpredictable streamflow and dams. If the Davis and Delphia-Melstone dams became passable to fish, it is likely other upstream dams would become the limiting factors to upstream fish movements during most flows. FWP studies suggest channel catfish and bass in the lower Musselshell can bypass the dams during high flow events, and often migrate between the Musselshell and the Missouri River. Efforts to secure fish passage at the lower dams remains a fishery priority. Other opportunities to improve fish passage at upstream diversions may present themselves in the coming years.

Many tributary streams like Flatwillow, Elk, and McDonald creeks may also contain numerous diversions that act as permanent barriers. In addition, various active and historic land management practices have resulted in degraded riparian areas and loss of natural stream function in these tributaries. As a result, many small prairie streams are incised and largely degraded. Any projects pursued in the lower Musselshell section should include improving fish passage barriers, updating outdated irrigation infrastructure, improving riparian condition, and increasing floodplain activity and function within these tributary systems.

Special Management Issues

Roundup Reach Flood Recovery

Substantial effort to improve flooding issues in the Roundup reach has led to several projects focusing on improving floodplain access and fish habitat. For example, Musselshell County has purchased properties to remove structures from the floodplain. Additionally, berms have been removed to reduce constrictions on the floodplain. Coal mine waste sites are in the process of being cleaned up and a Channel Migration Map was created for a section from the Naderman Diversion to the Kilby Butte Diversion below Roundup. This activity will reestablish a more natural floodplain and improve conditions for warmwater fish.

Goffena-Sudan Fish Bypass and Avulsion Reconnection

The Goffena-Sudan Diversion Dam Fish Passage and Bank Restoration Project is a continuation of Musselshell River rehabilitation and is a high priority project for the river basin. Water users built the diversion dam to provide irrigation water, but it is a fish barrier at baseflows and during the irrigation season. The 2011 floods, coupled with aging facilities, created structural issues for the dam, started an avulsion, and eroded and isolated portions of an irrigated field. Subsequent flooding in 2018 caused the

avulsion to completely form and cutoff 1.5 miles of river. Currently, this project is in the first stages of planning which includes conducting engineering surveys, completing the design needed to move forward with diversion upgrades, fish passage facilities, and avulsion repair. Expected benefits from the completion of this project include dam improvements to provide irrigation water, protect stream channel morphology and water quality, reduce future avulsion issues, improve fish passage, and expand aquatic habitat to support fish and other aquatic organisms on the middle and lower sections of the Musselshell. Efforts should also improve angling opportunity.

Newton-Pedrazzi Diversion Dam Removal

The Newton-Pedrazzi Dam is a privately owned diversion structure located two miles east of Roundup. Built in 1958 to provide irrigation water, the 2011 and 2018 floods damaged this concrete dam and is no longer functional. The dam and its spillway are still in the floodplain of the Musselshell River which limits fluvial geomorphic processes and contributes to the overall instability of the river. Removing the dam and grading to the existing floodplain elevation will provide greater floodplain access during seasonal high flows, allowing the river corridor to convey higher flows at lower velocities. Currently, under high seasonal flows, the existing dam creates a flood hazard by constricting flow and backwatering and hinders upstream fish movement. Expected benefits from removing the dam will improve river stability, reduce flood hazard, and improve fish passage. Efforts to implement this project are currently underway and could be complete by 2024.

Assessment of the Deadmans Diversion Dam Rock Ramp

In 2015, FWP and other interested stakeholders facilitated the installation of a rock ramp with step pool morphology on the downstream face of the Deadmans Basin Diversion Dam. The goal of the rock ramp is to provide passage opportunities to native minnow and sucker species and trout. Engineering surveys designed the slope of the ramp to be at 5% incline with step pools of 8-inches or less combined with boulders to provide respite and better accommodate prairie fish species passage. Although the design incorporated information collected in a laboratory setting regarding passage needs for similar fish, this project was the field test. Post-construction monitoring of fish populations suggests that the rock ramp is likely too steep in places and might be preventing passage for several species of minnows and suckers. A passage study will be implemented in the coming years to better assess passage and determine if the rock ramp needs any modifications.

Prairie Stream Surveys

There is growing concern about the status of small-bodied, native fish populations and their assemblages in prairie streams and tributaries throughout the state. Challenges to the long-term persistence of small-bodied fish include the introduction of non-native species, overharvest, habitat degradation and fragmentation, dewatering, and warmer temperatures. As an added challenge, data are limited regarding the distribution and relative abundance of many prairie fish. Establishing a prairie stream monitoring program will allow biologists and managers to better respond to issues such as fish stocking, low-head diversion dams construction or modifications, and bait use. Maintaining the prairie fish assemblages will also provide benefits to the larger sport fish species as prairie fish are often targeted prey by those predatory sport fish.

McCleary Meander Reactivation Project

In 2018, flooding led to an avulsion that disconnected 1.5 miles of river adjacent to Matt McCleary's property and abandoned an irrigation pump. The average slope of the river doubled in this section, causing extensive channel widening and bank erosion at the avulsion site. In 2021, FWP and others restored the abandoned 1.5-mile channel by realigning the river just upstream of an avulsion site in the middle Musselshell River. Efforts included constructing a new bank line and floodplain to plug the avulsion route. To stabilize the bank on the restored channel, the bank was lined with rock and capped the rock with alluvium and willow tree transplants. In addition, sediment was removed from the mouth of the old channel and placed 100-feet of riprap above and below the plug for bank stabilization. Below the channel plug, rock was placed in a low bank spot to ensure the bank will not be eroded when severe flooding occurs. The backside of the plug was sloped at a ratio of 3:1 to reduce over bank head cutting. Additional work is needed to modify or repair the avulsion (if needed), like planting willows and other aquatic vegetation to support bank stabilization throughout the meander reactivation. FWP anticipates work on the reactivation project to be completed by the end of 2023.

Box Elder Creek Low-Tech Restoration

Box Elder Creek is appropriate for low-tech restoration activities as much of the drainage exists in a moderate to severely incised state. This has resulted in depleted groundwater recharge, limited aquatic habitat, and reduced stream flows. Low-tech restoration activities, such as beaver dam analogs and post-assisted log structures, would be expected to increase floodplain connectivity and groundwater storage while improving long-term channel function. This project is currently in its conceptual phases with some landowner and partner collaboration already occurring. Planning, design, and implementation may occur in the next 4 years.

Passage Barrier Analysis on Flatwillow and McDonald Creeks

There are numerous historic and active diversion sites on Flatwillow and McDonald creeks that act as permanent barriers to aquatic organism movements. An assessment of these barrier sites and an analysis of alternatives that may improve fish passage while maintaining legal water use is necessary to identify, plan, and implement habitat improvement activities that would alleviate some of the habitat fragmentation present. This assessment will be a collaborative effort with local interest groups and stakeholders. Any restoration activities could occur within the next 4 years, but the primary emphasis will be on assessing existing conditions and considering alternatives.

Musselshell River Restoration Near Mosby

FWP will continue to support the planning, design, and implementation of habitat friendly streambank modification activities on the Musselshell River near Mosby. This is an ongoing project with numerous local partners and an engaged landowner. The project seeks to use alluvial brush matrix treatments on a large portion of streambank that is unstable and resulting in infrastructure concerns for a landowner. The Musselshell Watershed Coalition has sought a preliminary project design and cost estimate. The project may be implemented by 2024.

North Fork Musselshell Channel Restoration

Numerous channel alterations have occurred throughout the North Fork Musselshell drainage. FWP will support ongoing efforts to restore natural channel function and floodplain connectivity throughout the drainage. Such activities will provide near-term improvements for salmonid habitat and increase long-term resiliency to high and low flow conditions.

North Fork Musselshell Turbidity Study

The North Fork Musselshell River experiences chronic turbidity. The cause of the turbidity is uncertain, but increased turbidity likely has a negative impact on the trout fishery and other aquatic organisms. An assessment of the drainage to evaluate turbidity levels, potential sources, and cumulative effects would provide insights for management activities that might alleviate the turbidity issue in the drainage.

Gordon Butte Pumped Storage Project

The Gordon Butte Pumped Storage Project is a proposed hydropower project in the South Fork Musselshell drainage. The project was FERC licensed in 2015. No construction has occurred to date. The FERC license has been extended with a final deadline of December 2025. FWP will continue to monitor for project activities that may impact aquatic resources.

Petrolia Reservoir PIT Tag Study

Petrolia Reservoir provides a put-grow-take walleye fishery. The reservoir is productive, but conditions are highly variable as it is an onstream impoundment used for irrigation water storage. There is concern that mature walleye escape the reservoir when the spillway is active. This may be resulting a poorer quality fishery, as preferred size walleye may be lost from the reservoir. FWP plans to study this by installing a passive integrated transponder (PIT) array immediately downstream of the reservoir and tagging walleye in the reservoir. By monitoring the prevalence of escapement, FWP can evaluate the potential impacts to the fishery which will drive future management decisions at the reservoir.

Tiger Trout Stocking Assessment

Tiger trout are a sterile hybrid of brown and brook trout. FWP does not currently manage for or provide a tiger trout fishery. FWP will assess potential benefits and impacts associated with providing a tiger trout opportunity in Bair and/or Martinsdale Reservoirs. FWP will follow stocking and environmental review policies to consider the addition of tiger trout to either reservoir. If deemed appropriate, the species may be stocked in the reservoir within the next 4 years.

Martinsdale Kokanee Stocking Assessment

Kokanee salmon are a popular recreational fish species that would likely be well suited to conditions in Martinsdale Reservoir and would complement the existing fishery. FWP will follow stocking policy and environmental review to consider the addition of kokanee to Martinsdale Reservoir. If deemed appropriate, the species may be stocked in the reservoir within the next 4 years.

Bair Reservoir Natural Recruitment Assessment

The stocked rainbow trout fishery in Bair Reservoir routinely consists of low condition fish, generally less than 15-inches in length. Fish abundances are also very high. Stocking rates have been decreased in recent years to improve fish quality, however recruitment of wild fish produced in the North Fork Musselshell upstream of the reservoir may be the cause of the poor-quality stocked fishery in Bair. Assessing the degree of natural recruitment will provide important information that will guide future stocking rates at the reservoir.

Blue Sucker eDNA Project

Blue sucker are a state Species of Concern. They were last documented in the lower Musselshell in the early 1960s and are currently believed to be extirpated from the drainage, most likely due to the presence of Fort Peck Reservoir and the lack of a riverine confluence with the Missouri River. An eDNA study would potentially corroborate the lack of specimens sampled and provide further evidence of the species extirpation from the Musselshell drainage. These findings would guide future management actions regarding blue sucker in the Musselshell River.

Lower Musselshell Drainage Fish Movement

The lower Musselshell River is an important tributary of the Missouri River. There has been little study of the spawning and life history movements of recreationally important species and Species of Concern such as sauger, blue sucker, and burbot, among others. FWP plans to develop a monitoring program via PIT tags and associated antennae to elucidate fish movements and the importance of the lower Musselshell River and its tributaries to mainstem Missouri River fish populations. FWP will use the information gained from monitoring fish movement to direct future management decisions in the Musselshell drainage.

FISHERIES MANAGEMENT DIRECTION FOR MUSSELSHELL RIVER DRAINAGE

Water	Miles/acres	Species	Recruitment Source	Management Type	Management Direction
Musselshell River (lower) – mouth to U.S. Hwy 87 – and important tributaries	196 miles	Smallmouth bass, Walleye, Northern pike	Wild	General	Manage as a recreational fishery for consumptive harvest. Monitor for potential negative impacts to native species assemblage.
		Channel catfish (N)	Wild	Conservation	Manage as a recreational fishery. Consider harvest regulations to maintain populations at historic levels.
		Sauger (N)	Wild	Conservation	Manage to maintain/enhance populations within historic levels and provide a recreational fishery with limited harvest.
		Native minnows and suckers (N)	Wild	Conservation	Maintain/improve populations within historic levels.
		Freshwater drum (N)	Wild	Conservation	Maintain/improve populations within historic levels.
		Burbot (N)	Wild	Conservation	Maintain/improve populations within historic levels.
		Blue sucker (N)	Wild	Conservation	Believed to be extirpated from the drainage. Consider eDNA study to verify extirpation.
Sacagawea River – mouth to U.S. Hwy 191	82 miles	Native minnows and suckers (N)	Wild	Conservation	Maintain/improve populations within historic levels.

Habitat needs and activities: Chronic dewatering, recent flooding, and historic river manipulation have resulted in destabilization of the Musselshell. Water conservation efforts, reestablishment of accessible floodplains, and actions that attempt to restore the natural function of the river while accommodating

Water	Miles/acres	Species	Recruitment Source	Management Type	Management Direction
human infrastructure should be pursued. Continue to manage connectivity to favor native fish. Establish additional gage stations. Work with water users to maintain instream flows of at least 70 cfs from Musselshell diversion to mouth.					
Flatwillow Creek and important tributaries – mouth to Petrolia Dam	37 miles	Smallmouth bass, Northern pike	Wild	General	Manage as a recreational fishery for consumptive harvest. Monitor for potential negative impacts to native species assemblage.
		Walleye	Hatchery/ Wild	General	Manage as a recreational fishery with consumptive harvest. Monitor for potential negative impacts to native species assemblage. Evaluate population source and movements.
		Channel catfish (N)	Wild	Conservation	Manage as a recreational fishery. Consider harvest regulations to maintain populations at historic levels.
		Sauger (N)	Wild	Conservation	Manage to maintain/improve populations within historic levels and provide a recreational fishery with limited harvest.
		Native minnows and suckers (N)	Wild	Conservation	Maintain/improve populations within historic levels.
Petrolia Dam to U.S. Hwy 87	47 miles	Native minnows and suckers (N)	Wild	Conservation	Maintain/improve populations within historic levels.
U.S. Hwy 87 to Forks	33 miles	Brown trout, Brook trout	Wild	General	Manage as a recreational fishery.
		Native minnows and suckers (N)	Wild	Conservation	Maintain/improve populations within historic levels.

Water	Miles/acres	Species	Recruitment Source	Management Type	Management Direction
Johnson Coulee	4 miles	Northern redbelly dace (N)	Wild	Conservation	Maintain/improve populations within historic levels.
Elk Creek	50 miles	Native minnows and suckers (N)	Wild	Conservation	Maintain/improve populations within historic levels.
Yellow Water Creek	16 miles	Northern redbelly dace (N)	Wild	Conservation	Maintain/improve populations within historic levels.
North Fork Yellow Water Creek	10 miles				
Pike Creek	18 miles				
South Fork Flatwillow Creek	19 miles	Brook trout, Brown trout	Wild	General	Manage as a recreational fishery.
North Fork Flatwillow Creek	22 miles	Brown trout, Brook trout	Wild	General	Manage as a recreational fishery.
		Rainbow trout	Wild	Suppression/Removal	Manage as a recreational fishery where appropriate. Consider suppression and removal efforts to minimize risk of hybridization with nearby cutthroat trout populations.
McCartney Creek	5.5 miles	Brown trout, Brook trout	Wild	General	Manage as a recreational fishery.
		Rainbow trout	Wild	Suppression/Removal	Manage as a recreational fishery where appropriate. Consider suppression and removal efforts to minimize risk of hybridization with nearby cutthroat trout populations.

Water	Miles/acres	Species	Recruitment Source	Management Type	Management Direction
Half Moon Creek	7 miles	Westslope cutthroat trout	Wild	Conservation	Maintain and secure population from competition and hybridization. Manage as a recreational fishery with limited harvest.
<p>Habitat needs and activities: Chronic dewatering, riparian degradation, fragmentation, and channelization are all common habitat issues in the Flatwillow drainage. Opportunistically pursue projects that benefit water conservation, restore connectivity, and improve natural channel/riparian function. Substantial private land timber harvest has occurred in recent years and monitoring water quality metrics in impacted drainages would be beneficial. Work with water users to maintain at least 15 cfs in Flatwillow Creek from confluence of the North and South Fork to Petrolia Reservoir.</p>					
Box Elder Creek and important tributaries – mouth to Fergus County	64 miles	Native minnows and suckers (N)	Wild	Conservation	Maintain/improve populations within historic levels.
		Channel catfish (N)	Wild	General	Manage as a recreational fishery.
		Northern redbelly dace (N)	Wild	Conservation	Maintain/improve populations within historic levels.
		Smallmouth bass	Wild	Suppression/Removal	Consider suppression and removal efforts to minimize competition with and predation of native species.
Fergus County to headwaters	51 miles	Native minnows and suckers (N)	Wild	Conservation	Maintain/improve populations within historic levels.
Bear Creek	33 miles	Native minnows and suckers (N)	Wild	Conservation	Maintain/improve populations within historic levels.
		Northern pike	Wild	Suppression/Removal	Consider suppression and removal efforts to minimize competition with and predation of native species.

Water	Miles/acres	Species	Recruitment Source	Management Type	Management Direction
Habitat needs and activities: Riparian degradation and channelization have negatively impacted stream function, flows, and the aquatic habitat. Opportunistically pursue projects that benefit riparian habitats and natural stream function.					
McDonald Creek and important tributaries	72 miles	Native minnows and suckers (N)	Wild	Conservation	Maintain/improve populations within historic levels.
Chippewa Creek	25 miles	Northern redbelly dace (N)	Wild	Conservation	Maintain/improve populations within historic levels.
		Native minnows and suckers (N)	Wild	Conservation	Maintain/improve populations within historic levels.
South Fork McDonald Creek	32 miles	Native minnows and suckers (N)	Wild	Conservation	Maintain/improve populations within historic levels.
Athern Creek	7 miles	Northern redbelly dace (N)	Wild	Conservation	Maintain/improve populations within historic levels.
Tyler Creek	8 miles				
Surenough Creek	4 miles				
North Fork McDonald Creek	27 miles				
Alkali Creek	14 miles				
Horsethief Coulee	6 miles				
Habitat needs and activities: Riparian degradation, fragmentation, and channelization have negatively impacted stream function, flows, and the aquatic habitat. Opportunistically pursue projects that benefit riparian habitats, increase connectivity in the drainage, and improve natural stream function.					
Fords Creek and important tributaries – mouth to Maiden Creek	46 miles	Native minnows and suckers (N)	Wild	Conservation	Maintain/improve populations within historic levels.
		Northern redbelly dace (N)	Wild	Conservation	Maintain/improve populations within historic levels.

Water	Miles/acres	Species	Recruitment Source	Management Type	Management Direction
Maiden Creek to headwaters (East Fork)	10 miles	Brook trout	Wild	General	Manage as a recreational fishery. Evaluate potential competition impacts/risks with nearby cutthroat trout populations.
Brickyard Creek Log Gulch	25 miles 1 mile	Northern redbelly dace (N)	Wild	Conservation	Maintain/improve populations within historic levels.
Collar Gulch Creek	2 miles	Westslope cutthroat trout (N)	Wild	Conservation	Maintain/improve and secure population from competition and hybridization. Manage as a recreational fishery with limited harvest.
Chicago Gulch	3 miles	Brook trout	Wild	General	Manage as a recreational fishery. Evaluate potential competition impacts/risks with nearby cutthroat trout populations.
Habitat needs and activities: Riparian degradation, fragmentation, and channelization have negatively impacted stream function, flows, and the aquatic habitat. Opportunistically pursue projects that benefit riparian habitats, increase connectivity in the drainage, and improve natural stream function. Consider habitat projects that may benefit small, conservation population of westslope cutthroat trout in Collar Gulch and work to maintain/improve 0.6 cfs in Collar Gulch.					
Willow Creek	71 miles	Brook trout	Wild	General	Maintain viable population.
		Native minnows and suckers (N)	Wild	Conservation	Improve or maintain habitat and water conditions.
Musselshell River (middle) (U.S. Hwy 87 to Barber)	138 miles	Smallmouth bass	Wild	General	Monitor population to determine if management action is needed.
		Channel catfish (N)	Wild	Conservation	Continue wild transfer of a limited number of wild adults from the lower Musselshell into the middle Musselshell. Discontinue transfers if a population becomes established or transfers are unsuccessful.

Water	Miles/acres	Species	Recruitment Source	Management Type	Management Direction
		Sauger (N)	Wild	Conservation	Consider expanding population to Deadmans Diversion. Consider potential for fish transfers and stocking to accomplish.
		Native minnow assemblage (N)	Wild	General	Improve or maintain habitat and water conditions.
Habitat needs and activities: Improve habitat to support ecosystem function and production of trout, whitefish, and native minnow and sucker populations. Maintain flows of 80 cfs for habitat in the Musselshell River					
Currant Creek	60 miles	Native minnows and suckers (N)	Wild	Conservation	Improve or maintain habitat and water conditions.
Painted Robe Creek	38 miles	Native minnows and suckers (N)	Wild	Conservation	Improve or maintain habitat and water conditions.
Big Coulee	51 miles	Native minnows and suckers (N)	Wild	Conservation	Improve or maintain habitat and water conditions.
Careless Creek and Little Careless Creek	68 miles	Native minnows and suckers (N)	Wild	Conservation	Improve and maintain fish passage. This tributary is a priority stream for native small-bodied fish.
Habitat needs and activities: Identify opportunities to improve habitat for native small-bodied fish community.					
Swimming Woman Creek	33 miles	Brook trout	Wild	General	Manage as a recreational fishery at historic levels.
		Native minnows and suckers (N)	Wild	Conservation	Improve or maintain habitat and water conditions.
Fish Creek	86 miles	Brook trout	Wild	General	Manage as a recreational fishery at historic levels.
		Native minnow assemblage (N)	Wild	Conservation	Improve or maintain habitat and water conditions.
Musselshell River (upper) - confluence of	53 miles	Brook trout, Rainbow trout, Brown trout, Mountain whitefish (N)	Wild	General	Maintain and enhance populations.

Water	Miles/acres	Species	Recruitment Source	Management Type	Management Direction
North and South Forks to Barber					
American Fork	34 miles	Brook trout, Brown trout	Wild	General	Manage as a recreational fishery at historic levels.
Big Elk Creek	25 miles	Brook trout, Brown trout	Wild	General	Manage as a recreational fishery at historic levels.
Haymaker/ East Fork Haymaker	30 miles	Yellowstone cutthroat trout	Wild	General	Manage as a recreational fishery at historic levels. Test the East Fork population for genetic purity. Consider potential to use this population as a potential wild brood source with genetic mixing from other sources if found to be unaltered.
Lebo Creek	32 miles	Native minnows (N)	Wild	Conservation	Maintain population at historic levels.
Daisy Dean Creek	28 miles	Brook trout	Wild	General	Manage as a recreational fishery at historic levels.
Habitat needs and activities: Sedimentation and degraded riparian habitat are issues. Opportunistically work with USFS for solutions to reduce/prevent impacts on riparian area from ATV traffic on Daisy Dean.					
North Fork Musselshell River and important tributaries – mouth to Bair Reservoir	21.5 miles	Brown trout, Rainbow trout, Brook trout Mountain whitefish (N) Native nongame assemblage	Wild Wild Wild	General Conservation General	Manage as a recreational fishery with harvest. Maintain/improve populations within historic levels. Maintain/improve populations within historic levels.
- Bair Reservoir to headwaters	12 miles	Brook trout, Rainbow trout	Wild	General	Manage as a recreational fishery.
Mud Creek	8 miles	Northern redbelly dace (N)	Wild	Conservation	Maintain/improve populations within historic levels.

Water	Miles/acres	Species	Recruitment Source	Management Type	Management Direction
Spring Creek	10 miles	Brook trout, Rainbow trout, Brown trout	Wild	General	Manage as a recreational fishery.
Whitetail Creek Basin Creek	6 miles 3 miles	Brook trout	Wild	General	Manage as a recreational fishery.
Flagstaff Creek Checkerboard Creek and Forks	4 miles 13 miles	Brook trout, Rainbow trout, Brown trout	Wild	General	Manage as a recreational fishery.
Hall Creek Mill Creek Lion Creek	3 miles 3 miles 4 miles	Brook trout	Wild	General	Manage as a recreational fishery.
<p>Habitat needs and activities: Dewatering, degraded riparian conditions, habitat fragmentation, and chronic turbidity issues occur in the drainage. Opportunistically pursue projects that conserve water, increase connectivity, improve stream function and riparian habitats. Evaluate sources of chronic turbidity and pursue projects that may improve conditions in the North Fork and its tributaries. Work with water users to maintain at least 16 cfs in the North Fork below Bair Reservoir and at least 3 cfs above Bair Reservoir. Work with water users to maintain at least 8 cfs in Spring Creek. Work with water users to maintain at least 6 cfs in Checkerboard Creek.</p>					
South Fork Musselshell River and important tributaries	32 miles	Brown trout, Brook trout, Rainbow trout	Wild	General	Manage as a recreational fishery with harvest.
		Mountain whitefish (N)	Wild	Conservation	Maintain/improve populations within historic levels.
		Native nongame assemblage	Wild	General	Maintain/improve populations within historic levels.
Muddy Creek	9 miles	Brook trout	Wild	General	Manage as a recreational fishery.

Water	Miles/acres	Species	Recruitment Source	Management Type	Management Direction
Bonanza Creek and Forks	8 miles	Brook trout, Rainbow trout	Wild	General	Manage as a recreational fishery.
Comb Creek	8 miles	Brook trout	Wild	General	Manage as a recreational fishery.
Bozeman Fork Musselshell River	10 miles	Brook trout, Rainbow trout	Wild	General	Manage as a recreational fishery.
Indian Creek	3 miles	Brook trout	Wild	General	Manage as a recreational fishery.
Warm Springs Creek and tributaries	13 miles	Brook trout	Wild	General	Manage as a recreational fishery.
Dry Fork Musselshell River	2.7 miles	Brook trout	Wild	General	Evaluate presence of recreational fishery.
<p>Habitat needs and activities: Dewatering, habitat fragmentation, and riparian condition are issues in the drainage. Opportunistically pursue projects that conserve water, increase connectivity, and improve stream function and riparian habitats. Numerous irrigation diversions are present throughout the drainage and likely act as barriers to fish movement and entrain fish. Fish passage and screening projects would improve conditions. Continue to work with the Martinsdale Diversion operations to minimize negative impacts to South Fork fishery. A historic railroad grade, which bisects the valley bottom for much of the South Fork, has resulted in a substantial loss of floodplain access. Evaluating opportunities to address the railroad grade's impacts on stream function and a healthy riverscape should be emphasized. Work with water users to maintain at least 30 cfs in the South Fork.</p>					
Cottonwood Creek and important tributaries	13.1 miles	Brown trout, Brook trout, Rainbow trout	Wild	General	Manage as a recreational fishery with harvest.
		Native nongame assemblage	Wild	General	Maintain/improve populations within historic levels.
Lost Horse Creek	8 miles	Brook trout	Wild	General	Manage as a recreational fishery.

Water	Miles/acres	Species	Recruitment Source	Management Type	Management Direction
West Fork Cottonwood Creek	5 miles	Brook trout, Rainbow trout, Brown trout	Wild	General	Manage as a recreational fishery.
Middle Fork Cottonwood Creek – mouth to Forest Lake	5.3 miles	Brook trout, Rainbow trout, Brown trout, Cutthroat trout	Wild	General	Manage as a recreational fishery.
Forest Lake to headwaters	4 miles	Cutthroat trout	Wild	General	Manage as a recreational fishery with limited harvest. Continue to evaluate potential conservation value.
Eagle Creek	2 miles	Cutthroat trout	Wild	General	Manage as a recreational fishery with limited harvest. Continue to evaluate potential conservation value.
Loco Creek	7.5 miles	Brook trout, Rainbow trout, Brown trout, Cutthroat trout	Wild	General	Manage as a recreational fishery.
<p>Habitat needs and activities: Dewatering, habitat fragmentation, and riparian condition are issues in the drainage. Opportunistically pursue projects that conserve water, increase connectivity, and improve stream function and riparian habitats. Numerous irrigation diversions are present throughout the drainage and likely act as barriers to fish movement and entrain fish. Fish passage and screening projects would improve conditions. Continue to monitor Gordon Butte pumped storage project development and its impacts to aquatic resources. Work with water users to maintain 16 cfs in Cottonwood Creek.</p>					
Alabaugh Creek and important tributaries	10 miles	Brook trout, Brown trout, Rainbow trout	Wild	General	Manage as a recreational fishery with harvest.

Water	Miles/acres	Species	Recruitment Source	Management Type	Management Direction
Slaughterhouse Creek	5 miles	Native nongame assemblage	Wild	General	Maintain/improve populations within historic levels.
Robinson Creek	7 miles	Brook trout	Wild	General	Manage as a recreational fishery.
Hensley Creek	6 miles				
Hamilton Creek	2.3 miles				
Castle Creek	2.9 miles	Brook trout, Brown trout, Rainbow trout	Wild	General	Manage as a recreational fishery.
Boulder Creek	2 miles	Brook trout	Wild	General	Manage as a recreational fishery.
Habitat needs and activities: Habitat is generally intact. Portions of the drainage are confined by road infrastructure and road densities in the headwaters may negatively impact water quality. Opportunistically pursue projects that benefit riparian condition and water quality. Work with water users to maintain 12 cfs in Alabaugh Creek.					
Jakes Reservoir	20 acres	Yellow perch	Wild	General	Manage as a recreational fishery with liberal harvest to mitigate stunting.
		Sauger (N)	Wild	General	Manage as a recreational fishery. Allow remaining fish to age out and evaluate alternative species as top-level predator in reservoir.
		Channel catfish (N)	Wild	General	Manage as a recreational fishery. Continue to supplement population with wild fish transfers to evaluate potential to create self-sustaining population to act as top-level predator.

Water	Miles/acres	Species	Recruitment Source	Management Type	Management Direction
Habitat needs and activities: The dam and spillway structure are becoming compromised by continued erosion and putting the long-term persistence of the reservoir fishery in doubt. Opportunistically work with BLM to address options of extending lifespan of the reservoir.					
Petrolia Reservoir	500 acres	Walleye	Hatchery	Put-and-Take	Manage as a recreational fishery with consumptive harvest. Continue tagging efforts to monitor harvest trends. Evaluate natural recruitment. Evaluate escapement. Continue stocking based on the biology of the fishery. Manage for goals of: >5 walleye per net and 20-50 PSD.
		Yellow perch, Bluegill	Wild	General	Manage populations within historic levels and provide forage base. Contribute to recreational fishery. Consider population augmentation based on biology of the fishery.
		Northern pike	Wild	General	Manage as a recreational fishery with consumptive harvest and the potential for trophy fish.
		Rainbow trout	Hatchery	Put-and-Take	Supplement recreational opportunities via stocking when fish are available.
Habitat needs and activities: Reservoir elevations fluctuate drastically to the detriment of the fishery. Yellow perch spawning habitat and recruitment is limited during low water periods. Escapement of desirable game fish likely occurs during periods of high flow. Collaborative projects with sporting groups and the Petrolia Irrigation District that address the habitat needs should be opportunistically pursued.					
Yellow Water Reservoir	400 acres	Rainbow trout	Hatchery	Put-and-Take	Manage as a recreational fishery with harvest and quality opportunity. Continue to stock based on the biology of the fishery.
		Common carp, White sucker	Wild	Suppression/Removal	Consider options for suppression and removal for the benefit of the recreational fishery.

Water	Miles/acres	Species	Recruitment Source	Management Type	Management Direction
		Tiger muskie	Hatchery	General	Manage as biocontrol of undesirable species and unique, trophy opportunity with limited harvest. Continue stocking based on the biology of the fishery.
		Yellow perch	Wild	Suppression/Removal	Consider options for suppression and removal as the population is the result of an unauthorized introduction. Management options may include culling, liberal harvest, eliminating/suppressing recruitment, and/or mechanical/chemical removal.
		Largemouth bass, Channel catfish, Sauger, Walleye	Wild/ Hatchery	General	Species are not currently present in reservoir. Consider options of providing recreational opportunity should quality trout fishery not redevelop.
Habitat needs and activities: Reservoir elevations fluctuate drastically which may negatively affect the fishery. The reservoir experiences seasonal algal blooms that may negatively impact the fishery. Collaborative projects that address habitat needs should be opportunistically pursued.					
Deadmans Reservoir	2,120 acres	Tiger muskie	Hatchery	Put-Grow-and-Take/ Quality	Continue stocking at current rates, limit harvest to 1 over 40-inches. Used to reduce sucker population in reservoir to improve trout and salmon growth.
		Rainbow trout, Kokanee salmon	Hatchery	Put-Grow-and-Take	Evaluate rainbow strains and stocking rates to improve body condition and size structure in fishery. Adjust stocking rates to improve fishery.
Chief Joseph Pond	2 acres	Rainbow trout	Hatchery	Put-and-Take/ Family Fishing Water	Continue stocking at current rates.
Lebo Lake	309 acres	Tiger muskie, Rainbow trout, Brown trout	Hatchery	Put-Grow-and-Take	Former private pond/public fishing pond that is not currently managed. Work with partners to establish access and a viable fishery.

Water	Miles/acres	Species	Recruitment Source	Management Type	Management Direction
Martinsdale Reservoir	900 acres	Rainbow trout	Hatchery	Put-Grow-and-Take	Manage as a recreational fishery with consumptive harvest. Continue stocking based on the biology of the fishery. Manage for goals of: >5 rainbow trout per net.
		Brown trout	Hatchery	Put-Grow-and-Take	Manage as a recreational fishery and trophy opportunity. Manage to provide some biocontrol of nongame species. Continue stocking based on the biology of the fishery. Manage for goals of: >30 PSD-500.
		Suckers	Wild	Suppression	Consider options for suppression for the benefit of the recreational fishery.
		Tiger trout	Hatchery	Put-Grow-and-Take	Species is not currently present in reservoir. Consider options of providing additional unique recreational opportunity and biocontrol of nongame species.
		Burbot, Kokanee	Wild/Hatchery	Put-Grow-and-Take	Species is not currently present in reservoir. May be considered to provide additional recreational opportunity.
Habitat needs and activities: Reservoir elevations fluctuate drastically which may negatively affect the fishery.					
Hundred Dollar Bill Pond	18 acres	Rainbow trout	Hatchery	Put-Grow-and-Take	Manage as a recreational fishery with harvest by continued stocking and seek to provide quality opportunity.
Habitat needs and activities: Activities that benefit reservoir habitat would be pursued opportunistically.					
Bair Reservoir	250 acres	Rainbow trout	Wild/Hatchery	Put-Grow-and-Take	Manage as a recreational fishery with consumptive harvest. Evaluate natural recruitment. Continue stocking based on the biology of the fishery.

Water	Miles/acres	Species	Recruitment Source	Management Type	Management Direction
		Brook trout Suckers Tiger trout	Wild Wild Hatchery	General Suppression Put-Grow-and-Take	Manage for goals of: >10 rainbow trout per net, $W_r > 85$. Manage as a recreational fishery with harvest. Consider options for suppression for the benefit of the recreational fishery. Species is not currently present in reservoir. Consider options of providing additional unique recreational opportunity and biocontrol of nongame species.
Habitat needs and activities: Reservoir elevations fluctuate drastically which may negatively affect the fishery.					
Castle Lake	3 acres	Westslope cutthroat trout	Hatchery	Put-Grow-and-Take/ Mountain Lake	Manage as a recreational fishery with harvest. Continue stocking based on the biology of the fishery.
Habitat needs and activities: Activities that benefit lake habitat would be pursued opportunistically.					
Forest Lake	12 acres	Cutthroat trout	Wild	General/Mountain Lake	Manage as a recreational fishery with harvest. Continue to monitor and evaluate conservation potential.
Habitat needs and activities: Activities that benefit lake habitat would be pursued opportunistically.					
Private & public ponds with public access	-	Rainbow trout, Brook trout, Brown trout, Westslope cutthroat trout, Largemouth bass, Bluegill, Crappie, Yellow perch,	Hatchery/ Wild	General	Maintain existing pond fisheries available to the public for opportunity and harvest. Continue to stock as needed based on the biology. Consider additional wild fish transfers as needed. Consider liberalizing harvest on remote ponds with natural reproduction.

Water	Miles/acres	Species	Recruitment Source	Management Type	Management Direction
		Channel catfish, Northern pike, & others			
Habitat needs and activities: Enhance structure and consider aeration in ponds when possible and as needed. Seek additional opportunities.					